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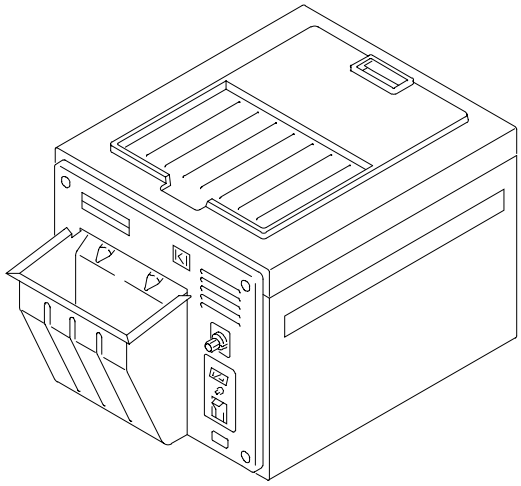
OPERATOR'S MANUAL
for the
Kodak M35 *X-Omat* PROCESSOR
Kodak M35A *X-Omat* PROCESSOR



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HEALTH IMAGING

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Section 1: Overview

Description

The KODAK *M35 and M35A* X-OMAT Processors are designed to process medical x-ray sheet or roll film that can be processed in KODAK *RP* X-OMAT Developer Replenisher and in KODAK *RP* X-OMAT Fixer and Replenisher. This self-threading roller transport system has:

- a film-length detection system
- a replenishment system
- a developer solution filter
- a recirculation system for the developer and fixer solutions
- an automatic standby feature

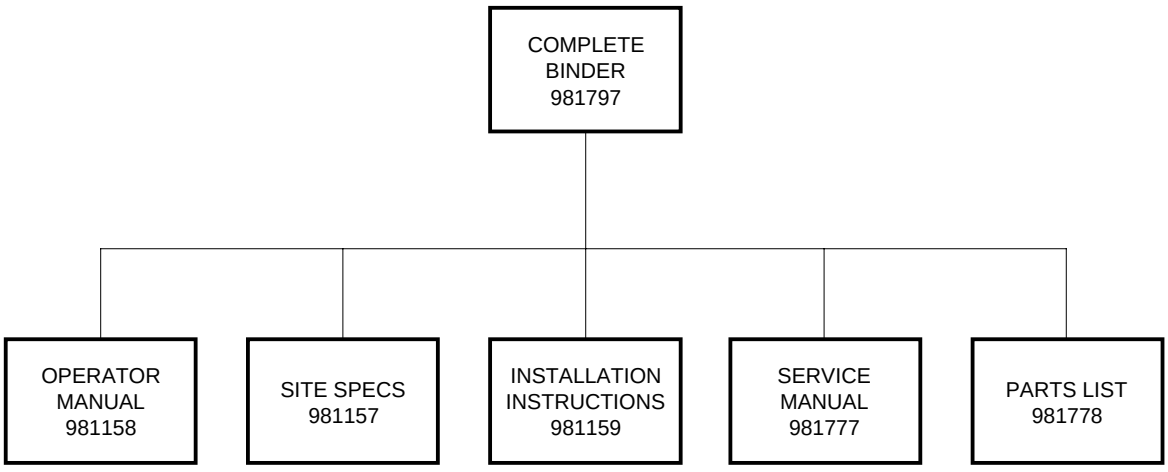
The transport speed is 30 inches per minute or 2 minutes and 20 seconds drop time (dry to dry) for a 24 cm sheet of film. The developer temperature is the standard 33.3°C ±0.3°C (92.0°F ±0.5°F). The immersion time in the developer solution is 33 seconds.

A film feed signal sounds 3 seconds after the film being processed has cleared the rollers of the Detector Crossover Assembly. This indicates that the processor is ready to accept another piece of film.

Publication Part Numbers

This publication is part of a series of instruction books that provide technical support information on the KODAK *M35 and M35A* X-OMAT Processors. It is recommended that these publications be kept in the binder provided. If an individual book is misplaced or destroyed, order another copy from your Eastman Kodak Representative using the Publication Part Numbers below.

Figure 1 **Related Publications for the M35 and M35A Processors**



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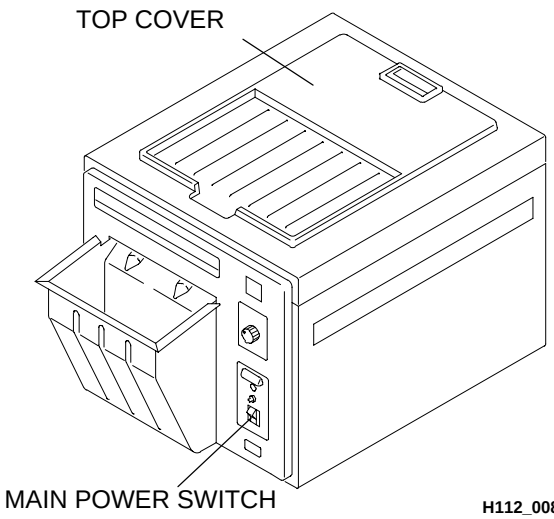
Use only qualified service personnel to perform all necessary adjustments and procedures.

Section 2: Processing Film

Start-Up

Figure 2 **Main Power Switch**



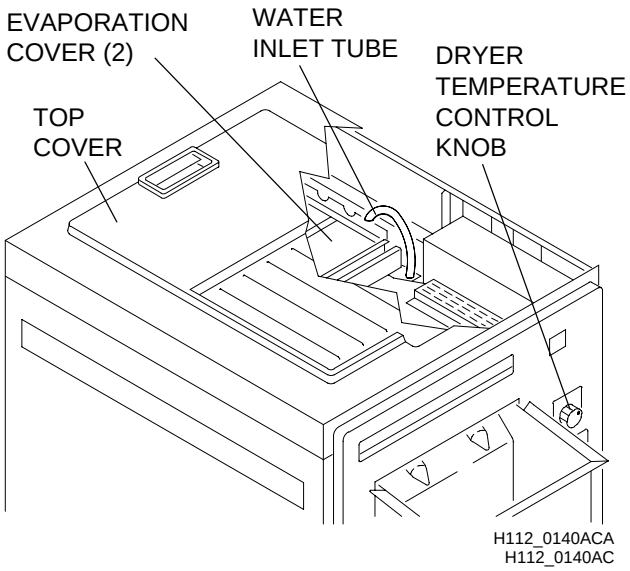
Warning

Keep fingers, clothing, cleaning materials, etc, away from the moving parts of the processor.

[1] Turn on the water supply and the Main Power Switch.

[2] Remove the Top Cover.

Figure 3 **Water Inlet Tube of the Wash Tank**



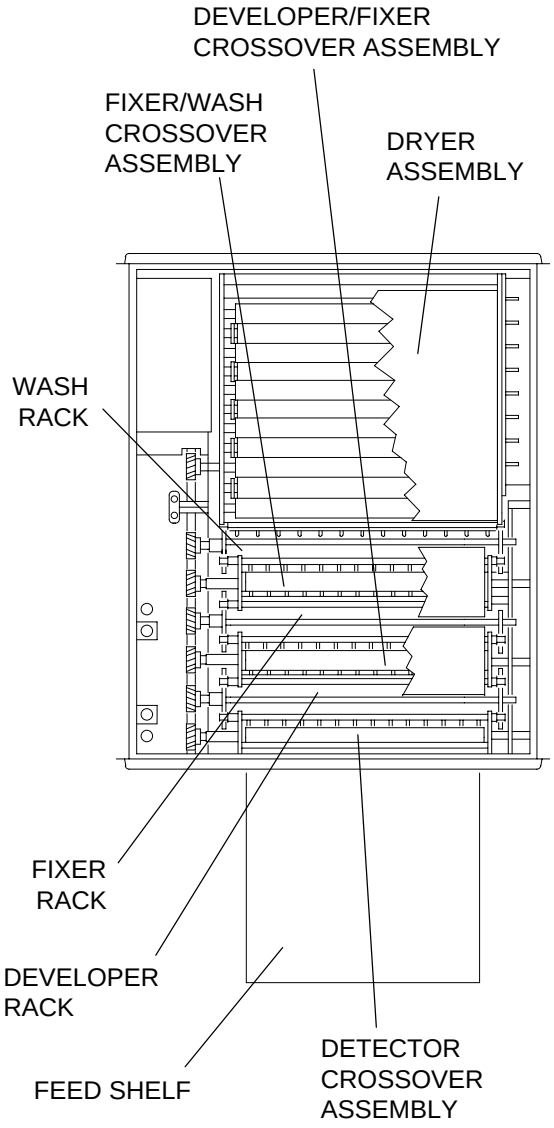
[3] Check the following are seated correctly. (See Figure 4.)

- Developer Rack
- Fixer Rack
- Wash Rack
- Fixer/Wash Crossover Assembly
- Developer/Fixer Crossover Assembly
- Detector Crossover Assembly
- Dryer Assembly

[4] Check:.

- the developer, fixer, and wash solutions are at the overflow level of the Weirs
- water is flowing from the Water Inlet Tube of the Wash Tank
- the Evaporation Covers are installed

Figure 4 **Racks and Crossovers**



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[5] Install the Top Cover on the processor.

[6] Press the Run/Standby Switch.

Note

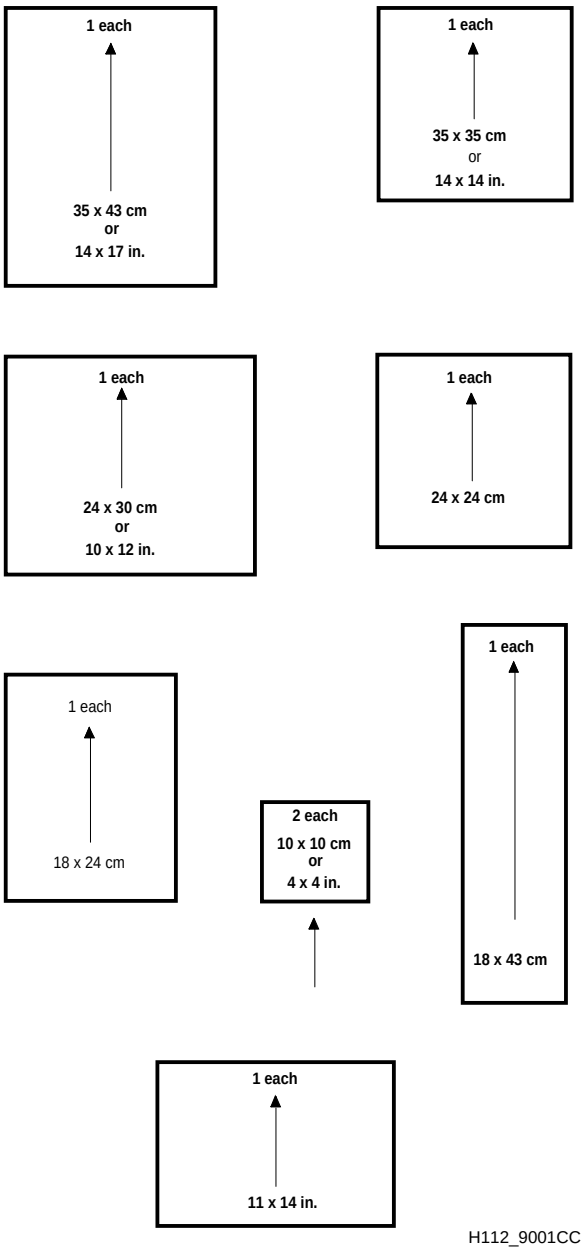
The Temperature Ready Light flashes when the developer solution is at the correct temperature for processing film.

[7] Feed a sheet of KODAK Roller Transport Cleanup Film, CAT No. 166 2303, into the processor when the Temperature Ready Light flashes. The recommended temperature is 33.3°C ±0.3°C (92.0°F ±0.5°F).

[8] Adjust the Dryer Temperature Control Knob to the lowest setting to dry the film.

Feeding Sheet Film

Figure 5 **Film Sizes and Direction of Film Feed**



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[1] Press the Run/Standby Switch.

Note

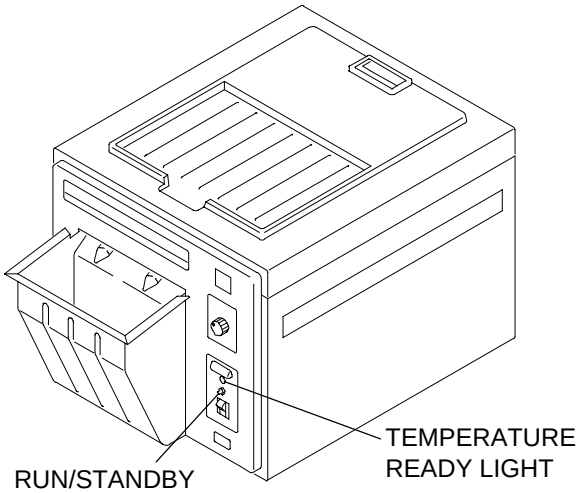
- The motors will begin to operate.
- After film removal, the processor will automatically return to the standby mode.
- The Temperature Ready Light flashes when the developer solution is at the correct temperature for processing film.

[2] Feed a sheet of film emulsion-side-up into the processor.

Note

A film feed signal will sound 3 seconds after the trailing edge of a sheet of film has left the rollers of the Detector Crossover Assembly.

Feeding 35 mm Roll Film



Caution

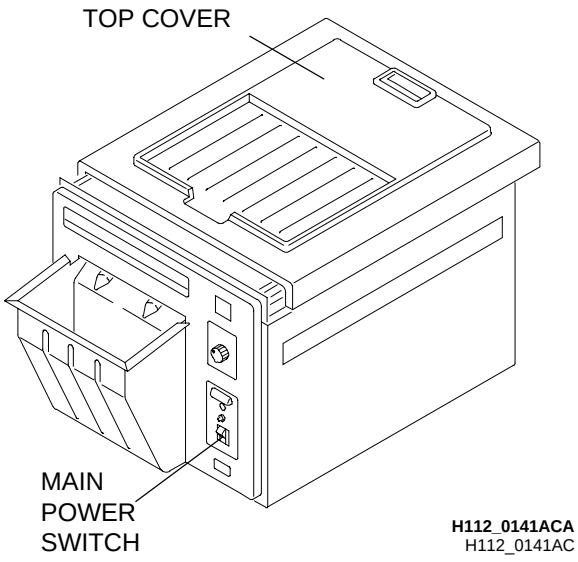
- The leader must be at least 18 cm (7 inches) long and 35 mm wide.
- The adhesive side of the tape must not be exposed.
- Other types of tape are unacceptable, because their bases are soluble in the processing solutions.

[1] Use a sheet of film as a leader.

[2] Use 2 cm (1 inch) wide 3M SCOTCH Brand Polyester Film Tape No. 850 to connect the sheet of film to the roll film.

Shutdown

Figure 6 **Processor in Shutdown Mode**



[1] Turn off the Main Power Switch and the water supply.

[2] Disconnect the main power.

[3] Remove the Top Cover and Evaporation Covers.

[4] Do the “Daily” cleanup procedure on page 19.

[5] Install the Top Cover with a 5 cm (2 in.) opening.

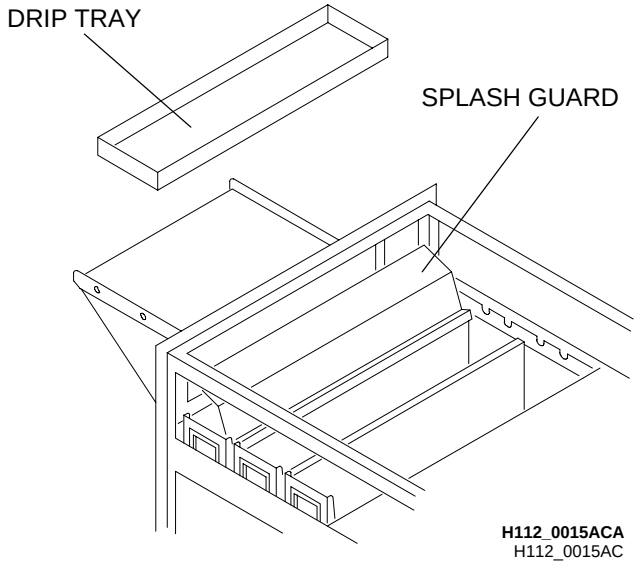
Important

Keep the Top Cover open overnight for venting purposes.

Section 3: Processing Solutions

Preparation

Figure 7 **Processing Tanks with the Splash Guard and the Drip Tray**



Caution

Avoid contamination of the processing solutions.

- To avoid spilling solutions from one tank into the next one, use the Splash Guard between the developer and fixer Tanks.
- **Slowly** install or remove the Racks.
- Use the Drip Tray when moving Racks to or from the processor.

[1] Mix the volume of processing solution required in the correct replenisher tank. Use the instructions packed with the chemicals to mix the solution.

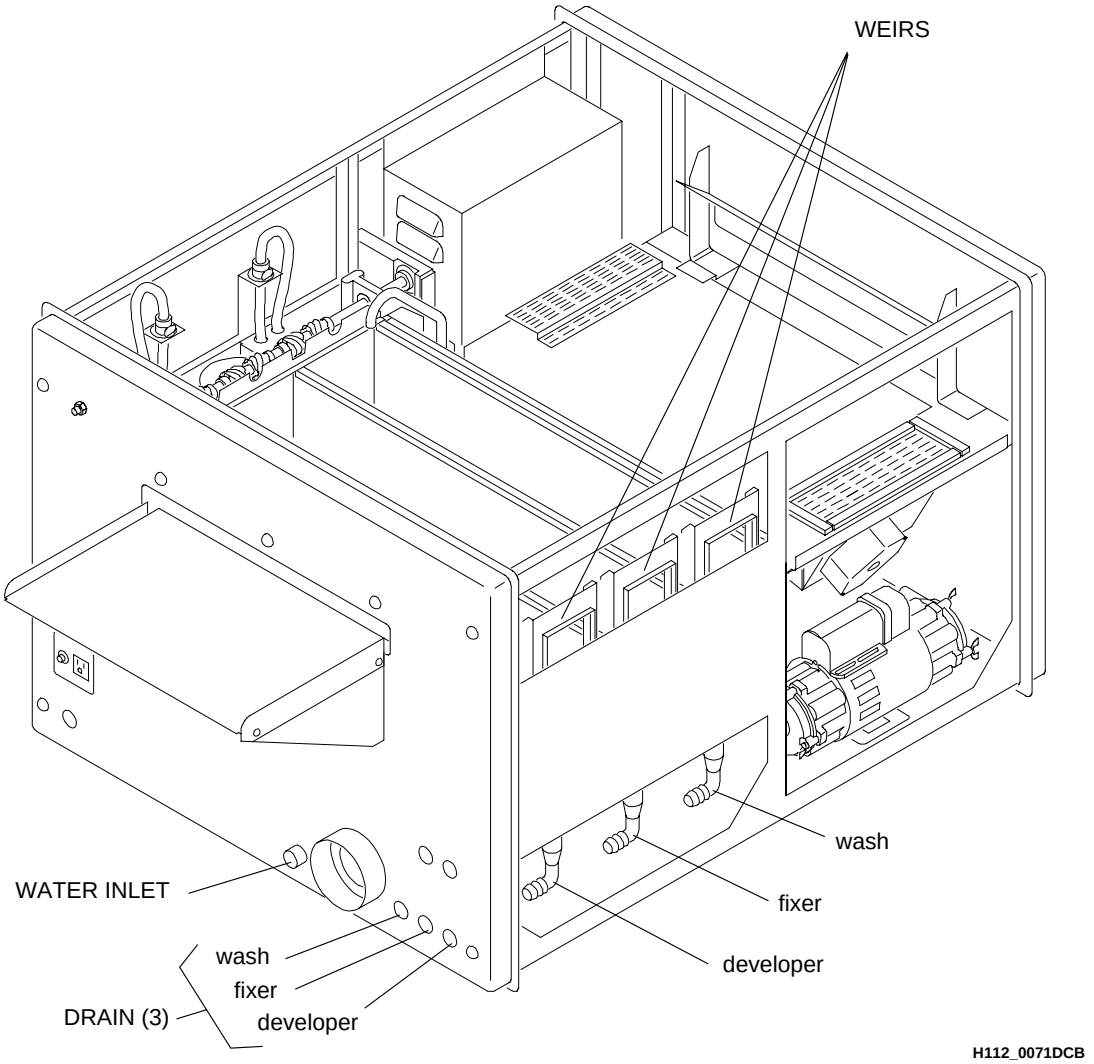
Important

Do not mix more than a 2-week supply for replenisher tanks with floatation lids.

[2] Remove the Crossover Assembly and the Rack from the Tank that is to be filled.

Draining the Tanks

Figure 8 **Draining the Tanks**



Caution

- Drain only one Tank at a time.
- Make certain that all drain materials and fluids comply with local, state, and federal regulations.
- Relatively small amounts of fixer can seriously contaminate the developer. If solutions are changed in both Tanks, fill **the Fixer Tank first** so that any solution spilling into the Developer Tank can be thoroughly cleaned.

[1] If the processor has a Silver Recovery Unit connected, disconnect the fixer drain tube at the input side of the Silver Recovery Unit. See Figure 14 on page 19.

[2] Lift the blue Weir from the Fixer Tank.

[3] Drain the fixer solution. Check the local codes for the correct disposal procedures.

[4] When the Fixer Tank is drained, install the blue Weir.

[5] Drain the Developer Tank in the same way.

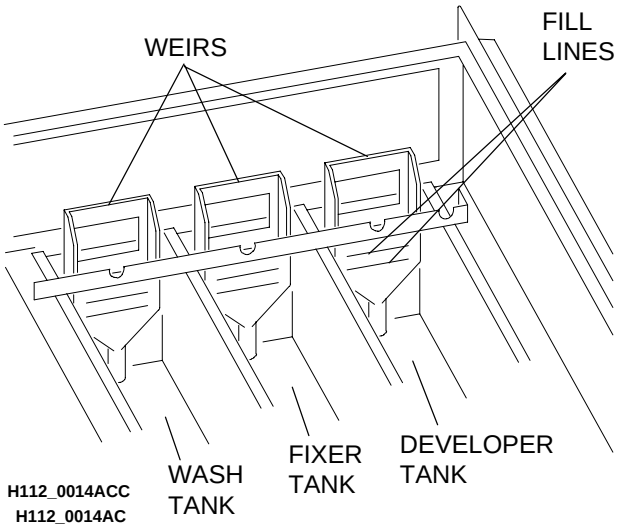
Important

Do not interchange the weirs.

Weir	Tank
red	developer
blue	fixer
beige	wash

Filling the Tanks

Figure 9 **Filling the Tanks**



Caution

- Mix the developer first, then the fixer.
- Wash the mixing equipment thoroughly between solutions to avoid contamination of the solutions.
- Rinse the mixing and filling equipment before each use.
- Fill the Fixer Tank **first.**

[1] Install the Splash Guard between the Developer Tank and the Fixer Tank. See Figure 7 on page 8.

[2] To fill the processor Fixer Tank, add fixer replenisher until the solution is at the higher Fill Line on the blue Weir.

[3] Remove and rinse the Splash Guard.

[4] Install the Splash Guard over the Fixer Tank.

[5] To fill the processor Developer Tank:

(a) Fill the Developer Tank **half full** of developer replenisher from the replenisher tank.

(b) Add 190 mL (6.5 fl oz) of KODAK *RP* X-OMAT Developer Starter.

(c) Fill the Developer Tank to the higher Fill Line on the red Weir with developer replenisher.

[6] Remove the Splash Guard and rinse thoroughly.

[7] Install the Racks in the correct Tanks. Seat them firmly.

Note

The washer on the top of the drive side of the Developer Rack has a “D” on it. The Fixer Rack has an “F”. The Racks may also have red, blue, and white wire ties for easy identification.

- **red** for the Developer Rack
- **blue** for the Fixer Rack
- **white** for the Wash Rack

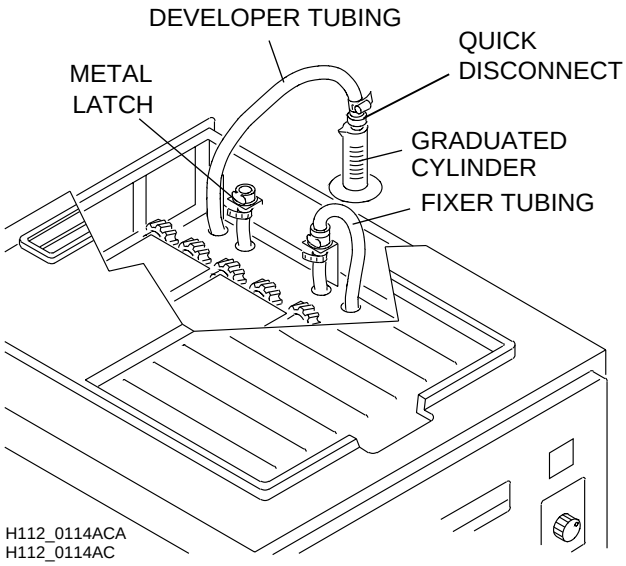
[8] Install the Crossover Assemblies, the Dryer Assembly, and the Evaporation Covers.

[9] Allow the developer to reach the operating temperature before processing any film.

Section 4: Replenishment

Checking the Replenishment Flow Rates

Figure 10 **Checking the Replenishment Flow Rates**



[1] Remove the Top Cover.

[2] Lift the Upper Roller of the Detector Crossover Assembly.

[3] Check that the replenisher solutions flow freely through the tubing located along the drive side of the Racks.

[4] Disconnect the Developer Tubing by pressing the Metal Latch.

Note

The Developer Tubing may have a red wire tie on it for easy identification.

[5] Pull the Developer Tubing slightly and rotate it over the edge of the frame and into a Graduate.

[6] Lift the Upper Roller of the Detector Crossover Assembly for the correct time, 28 or 34 seconds. See the table on the next page.

[7] When the Replenishment Pump stops, check that the amount of solution in the Graduated Cylinder is the same as in the table on page 14. If the amount is not correct, contact qualified service personnel.

[8] Connect the Developer Tubing again by pushing it into the Metal Latch until the Developer Tubing locks in place.

[9] Check the **fixer** replenishment flow rate by doing steps 3 - 8 with the Fixer Tubing.

[10] Install the Top Cover.

Figure 11 **Detector Crossover Assembly**

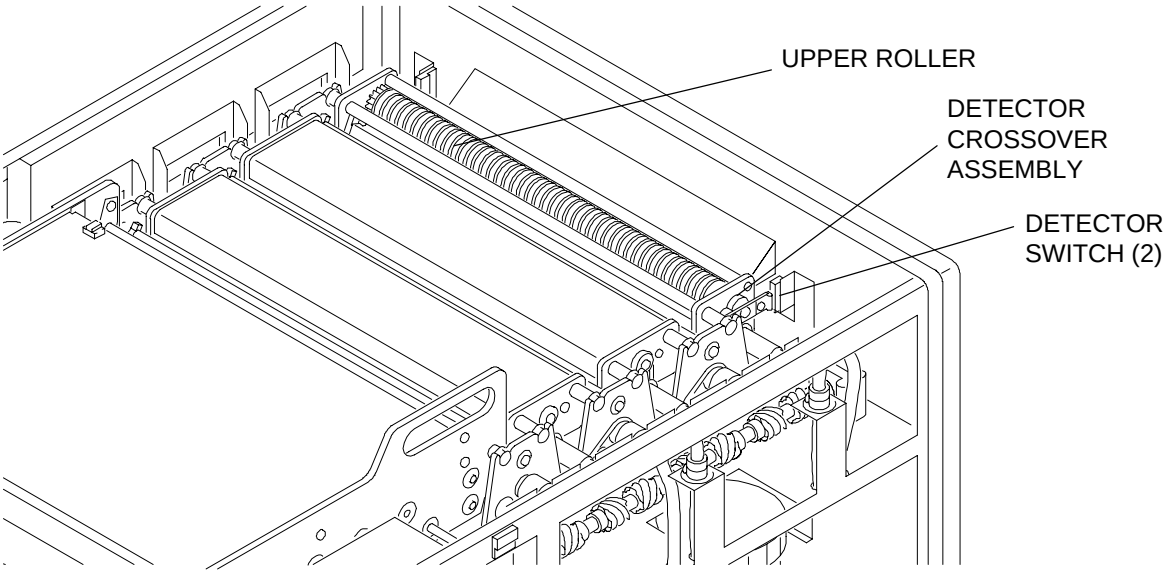


Table 1 Setting Replenishment Flow Rates

Film Size Processed	Use Condition	Average Amount of Film per 8 Hours of Processor Operation	Replenishment Flow Rate			
			mL per 35 cm (14 in.) 28 seconds of Film Travel		mL per 43 cm (17 in.) 34 seconds of Film Travel	
			Developer	Fixer	Developer	Fixer
Only 35 x 35 cm (14 x 14 in.) film	High	90 sheets or more	50	70		
	Medium	60 sheets	65	85	—	—
	Low	30 sheets or less	80	100		
Average size film intermix	High	115 sheets or more	50	70		
	Medium	80 sheets	65	85	—	—
	Low	40 sheets or less	80	100		
Only 35 x 43 cm (14 x 17 in.) film	High	75 sheets or more			60	85
	Medium	50 sheets	—	—	80	100
	Low	25 sheets or less			100	120

Note

- KODAK *RP* X-OMAT Chemicals are recommended.
- Replenishment rates are based on one sheet of film.
- Film feeding orientation should be consistent for best results.
- Slight sensitometric changes will occur as subsequent films are processed through a freshly started process. This is known as “seasoning” and is normal with any photographic process. Process control aims may have to be adjusted slightly to compensate.
- For 30 sheets or less, flooded replenishment is recommended.

Section 5: Correcting Difficulties

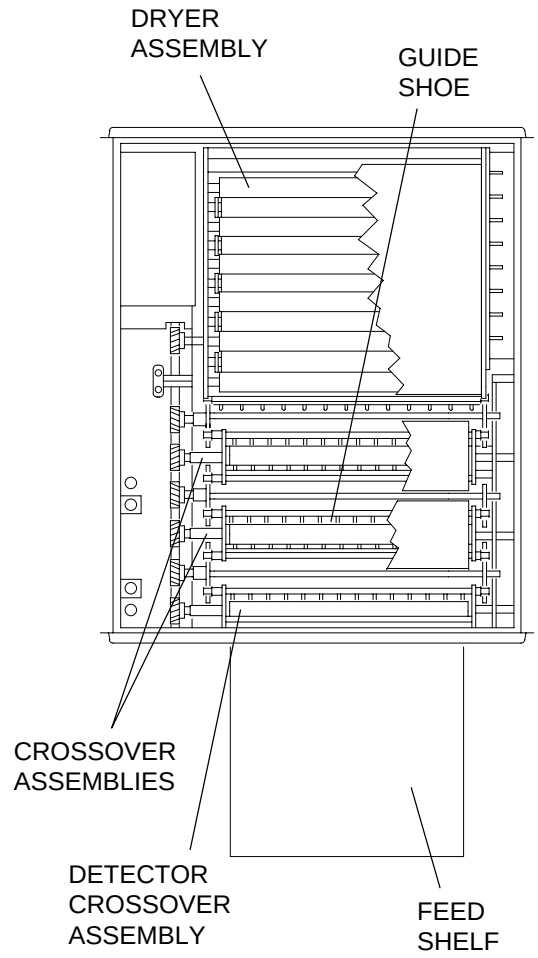
1	2	3	4	5	6	
						1. Transport Failure
						2. Surface Artifacts
						3. Abnormal Film Densities
						4. Wet Films
						5. Low Solution Levels
						6. Overlapping of Films
•					•	Film Feeding Error **Feed only single thicknesses of film. Feed the next film only after the film feed signal sounds. If there is no film feed signal, refer the difficulty to qualified service personnel.**
•	•	•	•			Feed only compatible films.
•					•	Check that all Racks and Crossovers are seated correctly.
•	•					Check that the surfaces of all the Rollers are clean and smooth, especially in the Developer Turnaround Assembly.
•			•			Check that the Dryer Air Tubes are in the correct positions.
	•		•			Remove any dirt from the Dryer Rollers and Air Tubes, especially the slots. Use a bottle brush and rinse with water.
	•	•	•	•		Check the replenishment settings are correct.
	•					Adjust the Dryer temperature control setting to the **lowest** possible temperature that still allows good drying.
	•					Clean the Feed Shelf and Detector Rollers.
•	•				•	Clean any biological growth in the Wash Tank with a mild solution of chlorine bleach. Use 60 mL (2 fl oz) of bleach per 3.8 L (1 gallon) of water. Wipe the Tanks with a soft sponge.
•				•		Check that the Weirs are seated correctly. Check that the Tanks are full.
•	•	•	•		•	Change any chemicals that were not mixed correctly, are exhausted, or are contaminated. Check that replenishment flow rates are correctly set. Fill the Replenishment Tanks if necessary.
•	•				•	Check that all Rollers are in place and positioned and rotating correctly.
•	•				•	Check that all Roller Gears, Sprockets, and Idlers are engaged.
•	•				•	Replace any Roller that has a broken or worn Gudgeons.
•	•				•	Replace any Bearings that do not allow the Turnaround Rollers to rotate correctly.
•	•					Check the tension on the Rack Chain. Check that the Rollers do not hesitate and that the Chain moves smoothly.
		•				With the Processor on, check for movement on the surface of the solutions. Movement indicates recirculation.
•	•					If the incoming wash water is dirty, clean the Rack and Tank thoroughly. Change the incoming water Filter. Make sure to use the correct water Filter.
			•			Check that the Dryer Air Exhaust is free from any obstruction.

1. Transport Failure						
	2. Surface Artifacts					
		3. Abnormal Film Densities				
			4. Wet Films			
				5. Low Solution Levels		
					6. Overlapping of Films	
1	**2**	**3**	**4**	**5**	**6**	
•					•	Check that the Turnaround Assembly is adjusted correctly. Make sure that the Turnaround Assemblies are square with the Racks.
	•	•				Check the incoming water temperature. Temperature must be between 4.4˚C (40˚F) and 29.4˚C (85˚F).
		•				Check that the correct Bulb and Safelight Filter are in the Safelight and at the correct distance from the Feed Shelf and work surface.
•		•				Check that the Top Cover and Panels are tight on the Processor. Check that there are no leaks in the Lighttight Gasket.
•						10 x 10 cm films — feed films diagonally if they fail to transport reliably.
					•	Check the time delay. For all transport speeds, the buzzer should sound once the trailing edge of the film has advanced 75 mm (3 in.) into the Processor.
•	•	•			•	Check that the tank solution levels are at the overflow Weirs.
•	•					Adjust the Guide Shoes correctly. NOTE: Most often in the Developer Turnaround. Adjust the long edges of the guide shoes in the exit turnaround as close as possible to the rack roller above them.
				•		Check for solution in the Replenishment Tanks. Fill if necessary. NOTE: Mix developer replenisher in quantities not to exceed a 2-week supply.
		•				With a thermometer of known accuracy, check that the temperature of the developer is correct for the mode selected -- Standard or Extended. If necessary, have qualified service personnel make adjustments. NOTE: Check the incoming water temperature. It must be a minimum of 4˚C (7˚F) lower than the desired developer temperature.
		•				Check that the correct Bulb is in the Safelight.
•						If the digital temperature display is blank and all noise ceases, including the Main Drive Motor and the Ventilation Fan, turn off the main power and the Main Power Switch on the Processor.
	•	•				Check that the problem film is compatible with the mode selected, Standard or Extended.

Section 6: Cleanup and Periodic Maintenance

Daily

Figure 12 **Daily Cleaning of the Racks and Crossovers**



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Warning

Dangerous Voltage. Disconnect the main power before doing any of the following cleanup procedures.

Note

The best time to do daily cleanup is at shutdown.

[1] Turn off the Main Power Switch.

[2] Disconnect the main power.

[3] Turn off the water supply.

[4] Remove the Top Cover.

Caution

- When removing the Crossover Assemblies, be careful not to twist them out of square or disturb the Guide Shoes.
- Use a damp cloth or a synthetic sponge and warm water. **Do not use any abrasive material** on the Racks, Crossover Assemblies, or Squeegee Rollers.

[5] Remove the Evaporation Covers and the Crossover Assemblies.

(a) Rinse the Evaporation Covers.

(b) Rinse the developer/fixer and fixer/wash Crossover Assemblies in warm water.

[6] Rotate and clean the Rollers with a soft brush and warm water.

[7] Dry the Rollers with a cloth or synthetic sponge.

[8] Wipe off all chemical deposits above the solution level in the processing section.

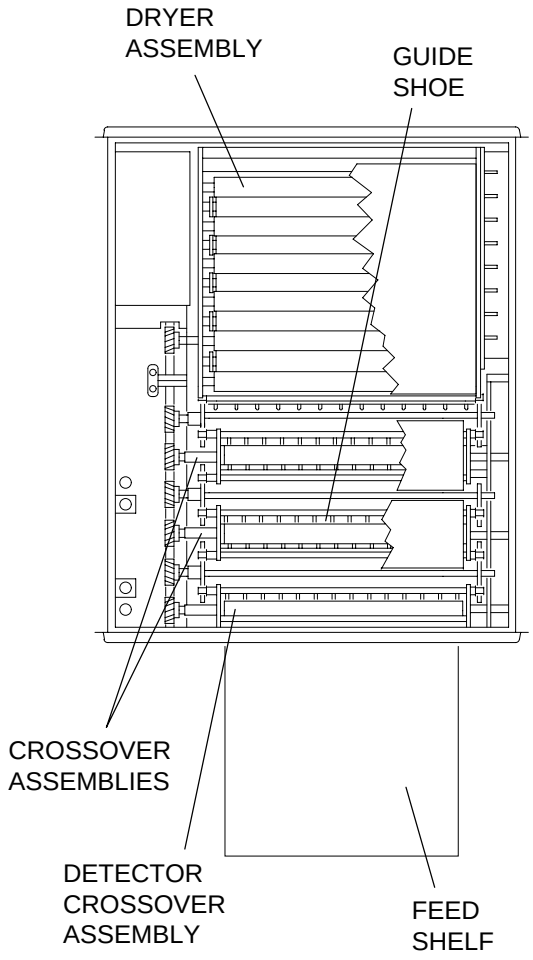
[9] Clean off debris or buildup from the dryer area with a warm, damp sponge or cloth.

[10] Install the Crossover Assemblies and the Evaporation Covers.

[11] Install the Top Cover leaving a 5 cm (2 in.) gap. **Keep the Top Cover open overnight for venting purposes.**

Every Two Weeks

Figure 13 **Biweekly Cleaning of the Racks and Crossovers**



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Warning

Dangerous Voltage. Disconnect the main power before doing any of the following cleanup procedures.

[1] Turn off the Main Power Switch.

[2] Disconnect the main power.

[3] Turn off the water supply.

[4] Remove the Top Cover.

Caution

- When removing the Crossover Assemblies, be careful not to twist them out of square or disturb the settings of the Guide Shoes.
- Use a synthetic sponge and warm water. **Do not use any abrasive material** on the Racks, Crossover Assemblies, or Squeegee Rollers.
- Do not rinse the Detector Crossover Assembly or the Dryer Assembly.

[5] Remove the Evaporation Covers and the Crossover Assemblies.

(a) Rinse the Evaporation Covers.

(b) Rinse the developer/fixer and fixer/wash Crossover Assemblies in warm water.

[6] Rotate and clean the Rollers with a soft brush and warm water.

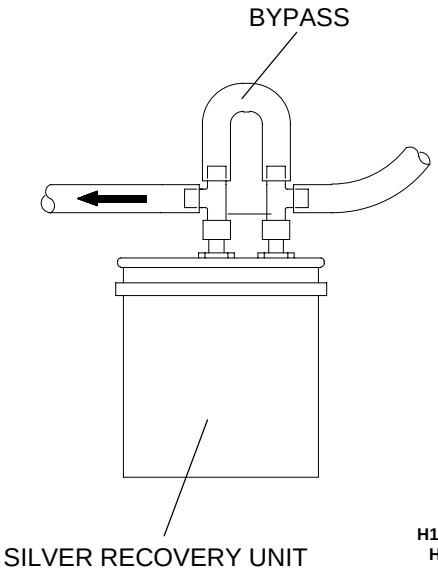
[7] Dry the Rollers with a damp cloth or synthetic sponge.

[8] Wipe off all chemical deposits above the solution level in the processing section.

[9] Remove the Dryer Assembly.

[10] Clean off debris or buildup from the dryer area and Dryer Assembly with a warm, damp sponge or cloth.

Figure 14 **Silver Recovery Unit**



Caution

- Fixer will contaminate the developer. When removing the Rack Assemblies, use the Splash Guard between the developer and fixer Tanks.
- Use the Drip Tray when removing or installing the Racks. See Figure 7 on page 8.
- Do not rinse the Detector Crossover Assembly or the Dryer Assembly.

[11] Remove the Racks.

[12] Rinse the Racks and wipe them with a cloth.

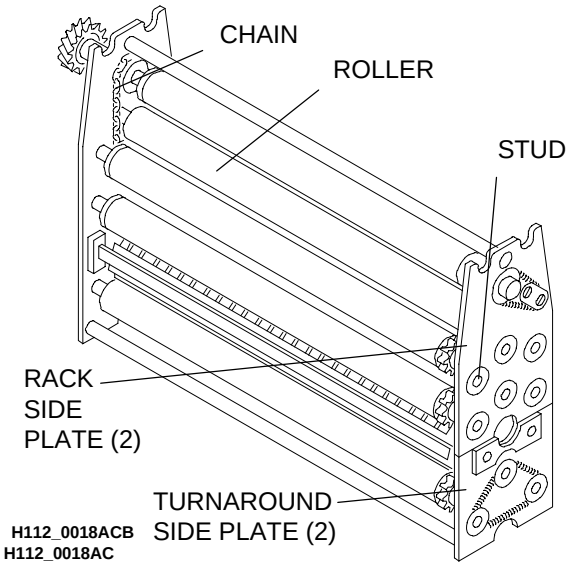
[13] Check the following:

(a) that the Chains move freely and are adjusted correctly

(b) that all the Rollers rotate correctly

(c) that the space between the Turnaround Side Plates and the Rack Side Plates is equal and that the Side Plates are parallel on both ends

Figure 15 **Rack and Turnaround Assembly**



[14] Check the operation of the Silver Recovery Unit, if installed.

[15] Check that no solution is flowing through the Bypass.

Note

If solution is present in the Bypass, the Silver Recovery Unit is not operating.

[16] Use KODAK Silver Estimating Test Papers, CAT No. 196 5466, to check the silver content of the solution flowing into the drain.

[17] If the test shows more than 1 gram/litre of silver, install a new cartridge in the Silver Recovery Unit.

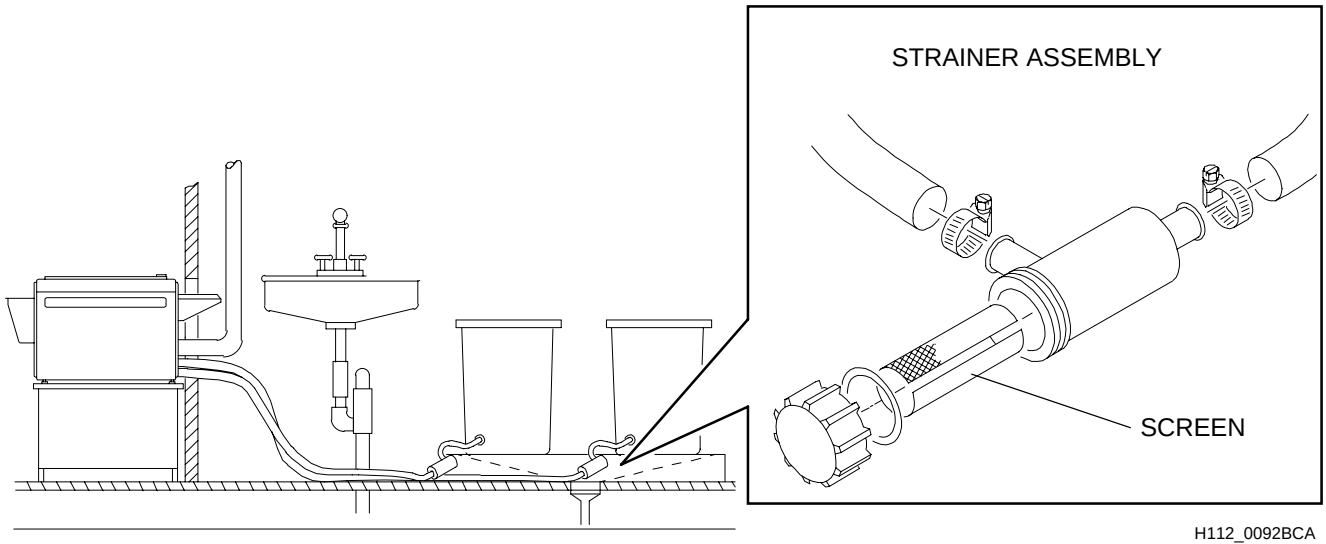
[18] Clean the Replenishment Strainers when mixing new chemicals.

(a) Place pinch clamps on the tubing to stop the replenishment flow.

(b) Disassemble the Strainer Assemblies.

(c) Use a brush and warm water to clean the Strainer Assemblies and to remove dirt and chemical deposits from the Screens.

Figure 16 **Cleaning the Replenishment Strainer Assemblies**



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Special Maintenance for Low or High Volume Usage

[1] If the processor handles a **low volume**, 25 sheets of film or less a day, do the following **every 2 weeks:**

Caution

If the PROCESSOR has a Silver Recovery Unit attached, drain only one Tank at a time. When draining the Fixer Tank, disconnect the Drain Tube at the input side of the Silver Recovery Unit, and direct it to the Floor Drain, before lifting the Weir.

(a) Remove the Weirs on the developer and fixer Tanks. See Figure 17.

(b) Drain the Tanks.

(c) Flush with clean water.

(d) Install the Weirs, red for developer and blue for fixer.

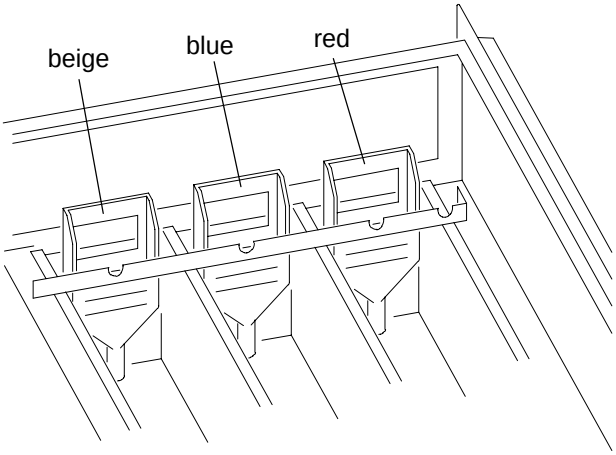
(e) To fill the processor **fixer** Tank, add fixer replenisher until the solution is at the higher Fill Line on the blue Weir.

(f) To fill the processor **developer** Tank:

Add 190 mL (6.5 fl oz) of KODAK *RP* X-OMAT Developer Starter.

Fill the developer Tank to the higher Fill Line on the red Weir with developer-replenisher solution.

Figure 17 **Weirs**



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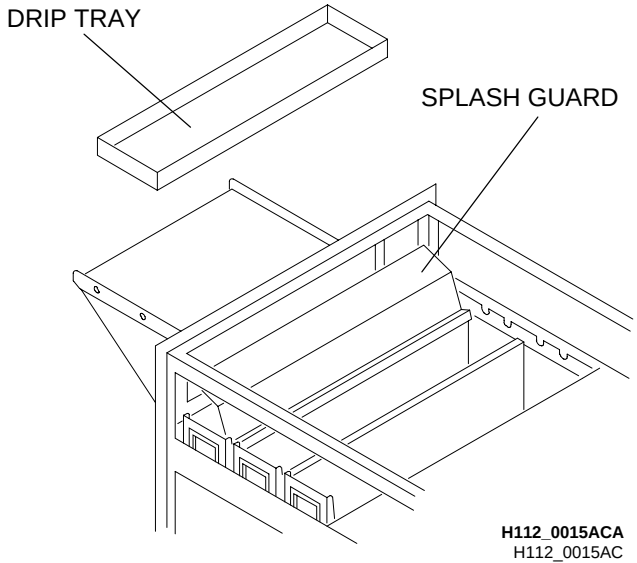
H112_0014AC

Figure 18 **Splash Guard and Drip Tray**



Caution

When installing the Racks, use the Splash Guard. Lower the Racks slowly.

(g) Install the Racks, the Crossover Assemblies, and the Dryer Assembly. Check that each assembly seats firmly.

(h) Turn on the main power, the water, and the processor.

(i) Check the solutions. If the surfaces of the solutions are moving, the recirculation pumps are operating.

(j) When the Temperature Ready Light flashes, use a thermometer of known accuracy and check the solution temperature in the developer Tank. The correct temperature is 33.3°C ±0.3°C (92.0°F ±0.5°F).

[2] If the processor handles a **high volume,** 25 sheets of film/day or more, do **steps (a) - (j) on a monthly** basis.

Section 7: New Equipment Warranty

Warranty Coverage

Kodak warrants this KODAK *M35 or M35A* X-OMAT Processors to function properly for 6 months from the date of initial installation, when installed within one year from the date of shipment.

If this equipment does not function properly during the warranty period, the dealer for KODAK X-OMAT Processors who sold the equipment will provide or arrange for repair of the equipment during the dealer's normal working hours. Such repair service will include any necessary adjustments and/or replacement of parts necessary to maintain your equipment in good working order.

How to Obtain Service

Should equipment require service, refer to the sales contract for details on whom to call for service, or contact the dealer for KODAK X-OMAT Processors who sold the equipment.

Limitations

- Warranty service is limited to the contiguous United States, the island of Oahu in Hawaii, and certain areas of Alaska.
- This warranty does not cover: circumstances beyond Kodak's control; misuse; abuse; any attachments, accessories, or alterations not marketed by Kodak (including service or parts to correct problems resulting from the use of such attachments, accessories or alterations); failure to follow Kodak's operating instructions; or supply items.
- Kodak makes no other warranties, express, implied, or of merchantability for this equipment.
- Repair without charge is Kodak's and the dealer's only obligation under this warranty.
  - **Kodak will not be responsible for any consequential or incidental damages resulting from the sale, use, or improper functioning of this equipment even if loss or damage is caused by the negligence or other fault of Kodak.**
  - Such damages for which Kodak will not be responsible, include, but are not limited to, loss of revenue or profit, downtime costs, loss of use of the equipment, cost of any substitute equipment, facilities or services or claims of your customers for such damages.
- This limitation of liability will not apply to claims for injury to persons or damage to property caused by the sole negligence or fault of Kodak or by persons under its direction or control.

Publication History

Print Date	Pub No.	ECO No.	Affected Pages	File Name	Notes
01SEP92	981158	4014-318	All	3047cm_a.txt	Supersedes Publications No. 635816 and 635037. The previous operating instructions for the M35 and M35A Processors were combined into one manual, and the information updated.
16OCT97	981158	4014-457	All	om3041_1_1oct97.doc	deleted steps that required the customer to do procedures that only qualified service personnel should do.
09JUL98	981158	4014-473	All	om3041_1_09jul98.doc	For MDD compliance,deleted steps that required the customer to do procedures that only qualified service personnel should do.

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